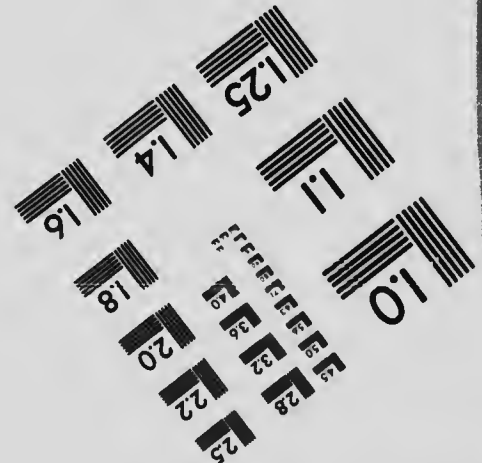
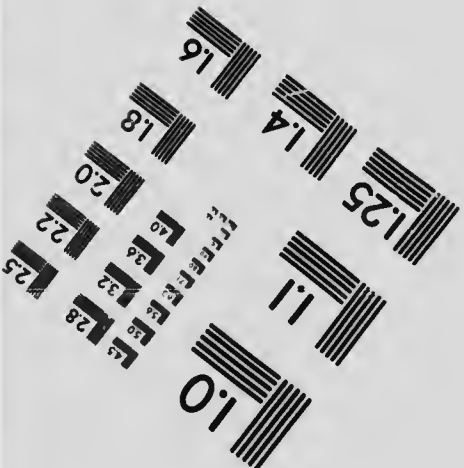
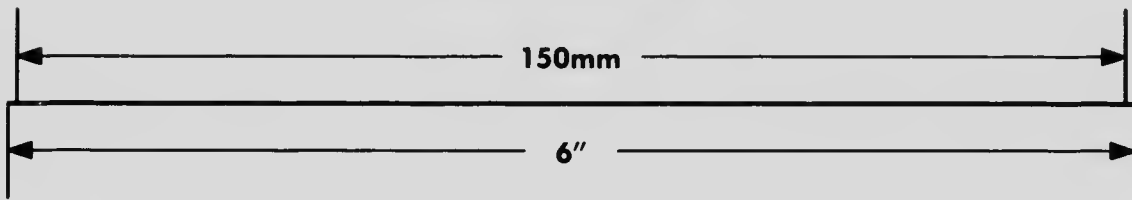
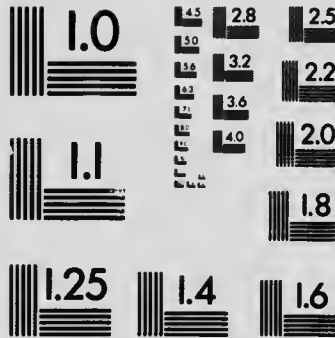
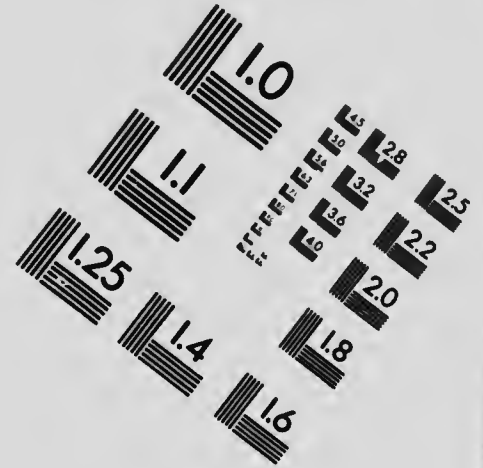
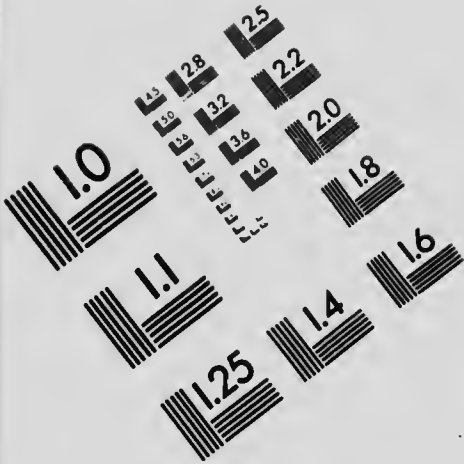


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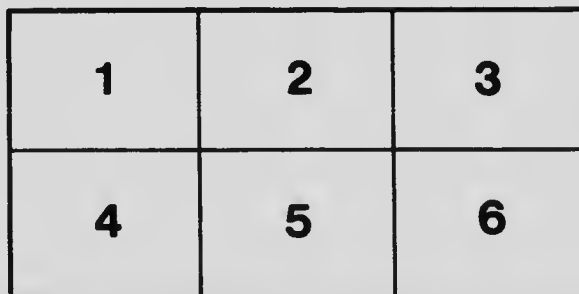
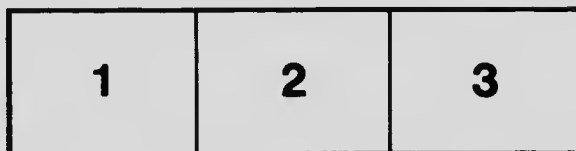
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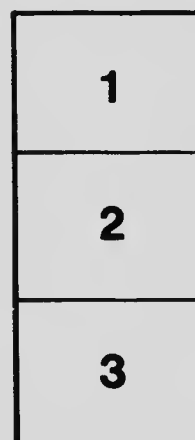
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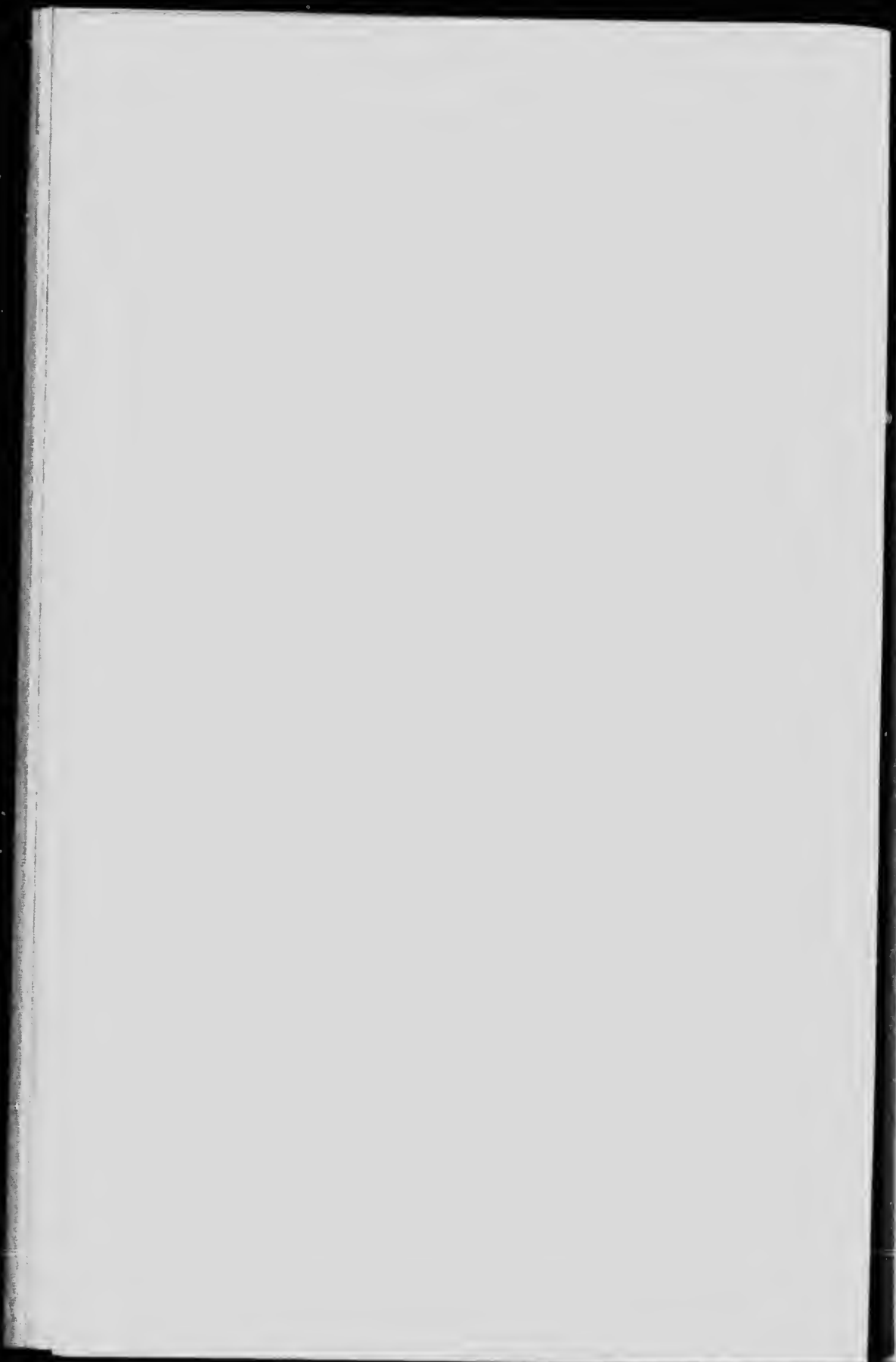
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THE ISOPODA OF THE BAY OF FUNDY

BY

N. A. WALLACE, B.A.

(PREPARED FOR PUBLICATION BY A. G. HUNTSMAN, BIOLOGIST TO THE  
BIOLOGICAL BOARD OF CANADA)

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## FOREWORD

During the summers of 1912 and 1913 Mr. Norbert A. Wallace worked at the Atlantic Biological Station, St. Andrews, New Brunswick. At the beginning he spent some time studying the *Argulidae* and in addition determined the food of a number of fishes. Latterly he spent his whole time in investigating the Isopod fauna of the region, the dredgings which were being made during those seasons throughout the Western Archipelago and at St. Mary bay, Nova Scotia, furnishing him with the material for his investigations. He was most indefatigable and painstaking in this work, which he continued to some extent during the succeeding winters at the Biological Department, University of Toronto. His untimely death on December 3rd, 1914, cut short a brilliant career.

Unfortunately he had only reached the stage where he was about to prepare the manuscript of his report, which was, therefore, in an incomplete state. His drawings of the species were not all completed, and he had made only preliminary drafts of the descriptions and accounts of distribution. It has been necessary for us to collate these and at the same time eliminate, add, or reconstruct freely. Where feasible his accounts are used *verbatim*. He had neither named the new species nor examined all the literature to make certain that they had not already been named and described. We have not been able to refer them to any of the described species and, therefore, believe them to be new. No attempt has been made, however, to examine critically the species of the genera to which they belong so as to determine their relationships with the described species.

If Mr. Wallace had lived, he would undoubtedly have rendered this account much more complete. We hope that no serious mistakes have been made in its final preparation. The study embodied in this paper was carried on with the assistance of the Biological Board of Canada and of the Biological Department of the University of Toronto.

A. G. H.



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## THE ISOPODA OF THE BAY OF FUNDY

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### INTRODUCTION

In 1853 Stimpson reported in his "Synopsis of the Marine Invertebrata of Grand Manan" a total of nine species of Isopods from that island. These are in current nomenclature

*Leptocheila filum*,  
*Gnathia cerina*,  
*Calathura branchiata*,  
*Cirolana polita*,  
*Chiridotea tuftsii*,  
*Idothea baltica*,  
*Edotea triloba*,  
*Jaera marina*,

and *Janira alta*.

Harger in his "Report on the Marine Isopoda", published in 1880, added six species to the fauna of the Bay of Fundy, which are

*Ptilanthura tenuis*,  
*Limnoria lignorum*,  
*Idothea phosphorea*,  
*Munna fabricii*,  
*Munnopsis typica*,  
and *Bopyroides hippolytes*.

Mr. Wallace now adds twelve species, of which five are new to America although known from Europe, and three are new to science.

Those merely new to the Bay of Fundy are

*Aega psora*,  
*Chiridotea caeca*,  
*Synidotea nodulosa*,  
and *Phryxus abdominalis*.

6 WALLACE: THE ISOPODA OF THE BAY OF FUNDY

Those new to the American coast are

*Typhlotanais aequiremis*,  
*Pleurogonium rubicundum*,  
*Pleurogonium inerme*,  
*Pleurogonium spinosissimum*,  
and *Eurycope mutica*.

The species new to science are

*Typhlotanais mananensis*,  
*Leptognathia* (?) *psammophila*,  
and *Leptocheilia profunda*.

It is significant that the species new to America are all very small and that those new to science are not only small, but belong to the difficult group of the Tanaidacea. Future additions to the list of Isopods will doubtless be in this same direction, namely, that of the minute forms, including parasites.

In addition to the marine forms, Mr. Wallace has listed three species of terrestrial Isopoda from the shores of the Bay of Fundy. They are all well known species, but their distribution in eastern Canada has not been signalized. With these the list of species from the Bay of Fundy has reached the number of thirty.

A. G. H.

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## ACCOUNT OF THE SPECIES

Family *Tanaisidae*

*Typhlotanais aequiremis* (Lilljeborg). Figure 1.

Sars, 1899, p. 21.

The single specimen obtained—a female—was taken off Big Duck Island, Grand Manan, at a depth of 55 fathoms on muddy bottom.

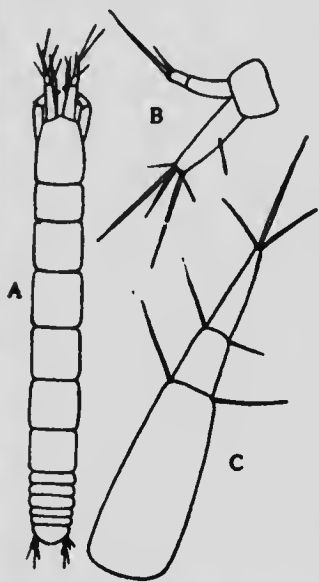


FIG. 1. *Typhlotanais aequiremis*; (A), female, dorsal view, x 30; (B), uropod x 240; (C), first antenna, x 240.

The body is elongated and very slender, slightly over seven times as long as broad, and much depressed. The cephalosome is slightly longer than it is broad and the anterior margin slightly excavate on either side of a blunt median point. The first pair of antennae have the first article longer than the other two combined. The second pair of antennae are similar to those of the next species. The thorax is cylindrical in shape, having the first segment the shortest, the second, third, fourth, and fifth subequal, and the sixth slightly shorter than the fifth, but longer than the first.

The chelipeds are somewhat stouter than those of the next species, while the other legs are much as in that species, the three posterior pairs having the basal article expanded and stout.

The abdomen is composed of six segments, the last one being rounded posteriorly. The uropods are biramous, the peduncle of each is quite stout, and the two branches are

approximately equal in length, the outer being biarticulate and ending in a strong bristle, while the inner is uniarticulate, but gives an indication of subdivision in having a hair at about its middle.

*Typlotanais mananensis*, sp.n. Figure 2.

A single female of this species was dredged outside Big Duck Island, Grand Manan, at a depth of 42 fathoms on a muddy bottom.

The body is elongated and very slender, being nearly nine times as long as broad (about 1.8 mm.: 0.23 mm.). The head is about twice as long as broad and narrower in front. The anterior margin is produced in the mid-line to form a short, sharp rostrum. The first pair of antennae are short, conical, and very stout at their base. Each consists of three articles of which the first is very stout and a little longer than one half of the whole antenna, the second is less than a quarter as long as the first and much narrower, and the third is one and one-half times as long as the second and narrower. The second pair of antennae are more slender than the first and are composed each of six articles, of which the first is very short and slender, the second somewhat dilated and a little longer than the first, the third a little longer and narrower than the second, the fourth twice as long as the third, the fifth a little over one-half the length of the fourth, and the sixth very short and almost inconspicuous.

The first thoracic segment is united to the head, while the remaining segments are free. The second is the shortest, the third, fourth, fifth and sixth are subequal in length and about twice as long as the second, and the seventh is shorter than the sixth.

The abdomen consists of six free segments, of which the first five are subequal in length, while the sixth is a little longer than the others, approximately quadrilateral in shape, and very obtusely angular behind.

The uropods are biramous, the peduncle consisting of a single, stout article, the outer branch of two subequal articles,

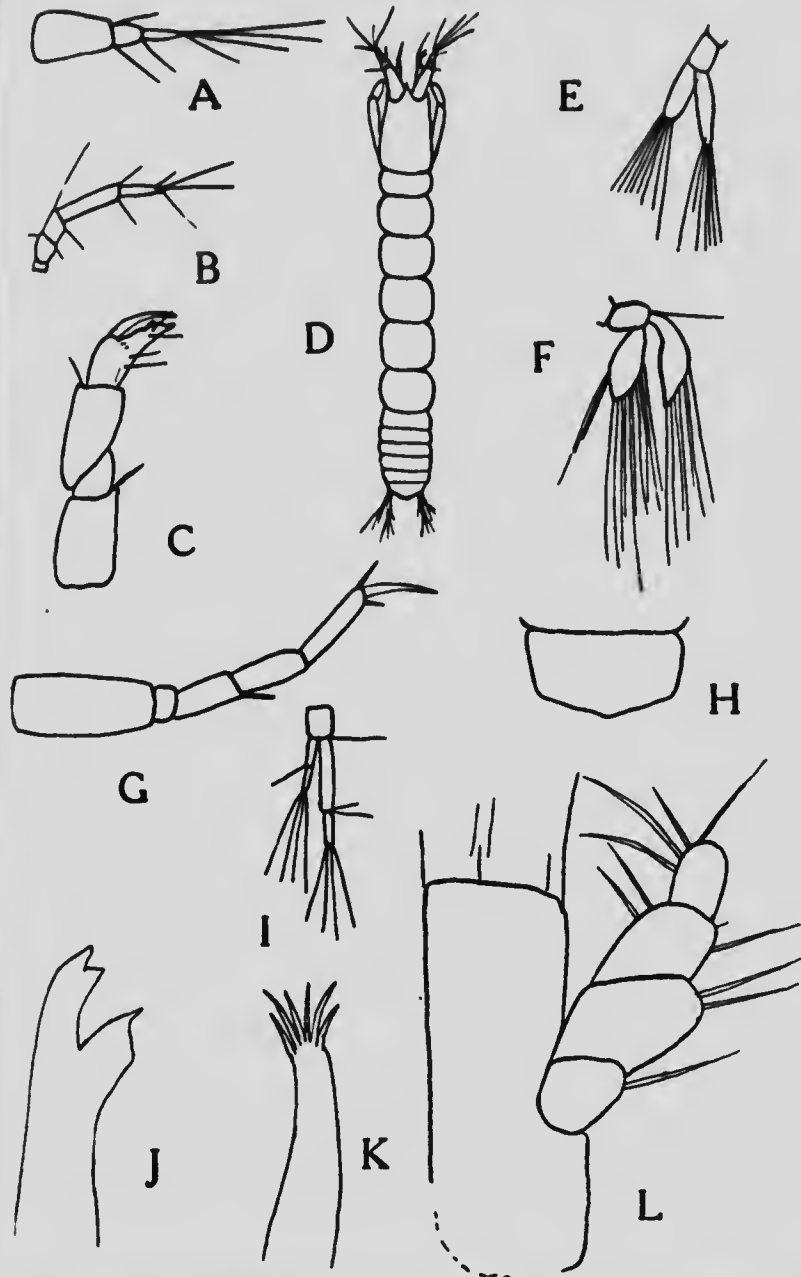


FIG. 2. *Typhlotanis mananensis*, sp.n.; (A), first antenna, x 120; (B), second antenna, x 120; (C), gnathopod, x 120; (D), female, dorsal view, x 30; (E), second pleopod, x 120; (F), fifth pleopod, x 120; (G), seventh leg, x 240; (H), terminal segment, x 120; (I), uropod x 120; (J), mandible, x 480; (K), maxilla, x 480; (L), maxilliped, x 480.

and the inner branch of two articles, of which the first is three times as long as either of those of the outer branch, and the second one-half as long as the first.

The gnathopods are very slender. The propodus is very poorly armed, the inner surface being only slightly roughened and having one short spine at the tip. The articles of the legs are all slender, except that the basal ones of the fifth, sixth and seventh legs are expanded and quite stout. Of the five pairs of well developed, biramous pleopoda, the first four are alike, while the fifth differs in that the inner edge of the inner ramus is slightly emarginate near the distal end. The mouth parts are normal.

*Leptognathia* (?) *psammophila* sp.n. Figure 3.

Females only of this species were found and in sand at two localities—near West Quoddy at a depth of nine fathoms, and at Woodward's cove, Grand Manan, from low tide mark to a depth of two fathoms.

The body is elongate and narrow, being more than six times as long as broad (about 3 mm. : 0.48 mm.). The head is longer than it is broad and wider behind than in front. The anterior margin of the head is produced medially into a very short, rounded, blunt rostrum, on each side of which is a shallow, angular excavation which lodges the peduncle of the first antenna. The latter, which is directed forwards, is composed of three articles, of which the first is long and stout, the second narrower than and only one-third as long as the first, and the third as long as the second. The second antenna is not so long as the first, and is composed of six articles. Of these the first is short and stout, the second one-third longer than the first, the third equal to the first, the fourth as long as the first three articles together and usually curved, the fifth one-fifth the length of the fourth, and the sixth very small and inconspicuous.

Of the thoracic segments, the second (the first free one) is the shortest, the third, fourth, fifth and sixth are all subequal and each one and one-half times as long as the second,

WALLACE: THE ISOPODA OF THE BAY OF FUNDY 11

and the seventh approximately equal in length to the second. The thorax narrows to the seventh segment.

The sixth segment of the abdomen is longer than any of the others, which are subequal, and is rounded posteriorly.

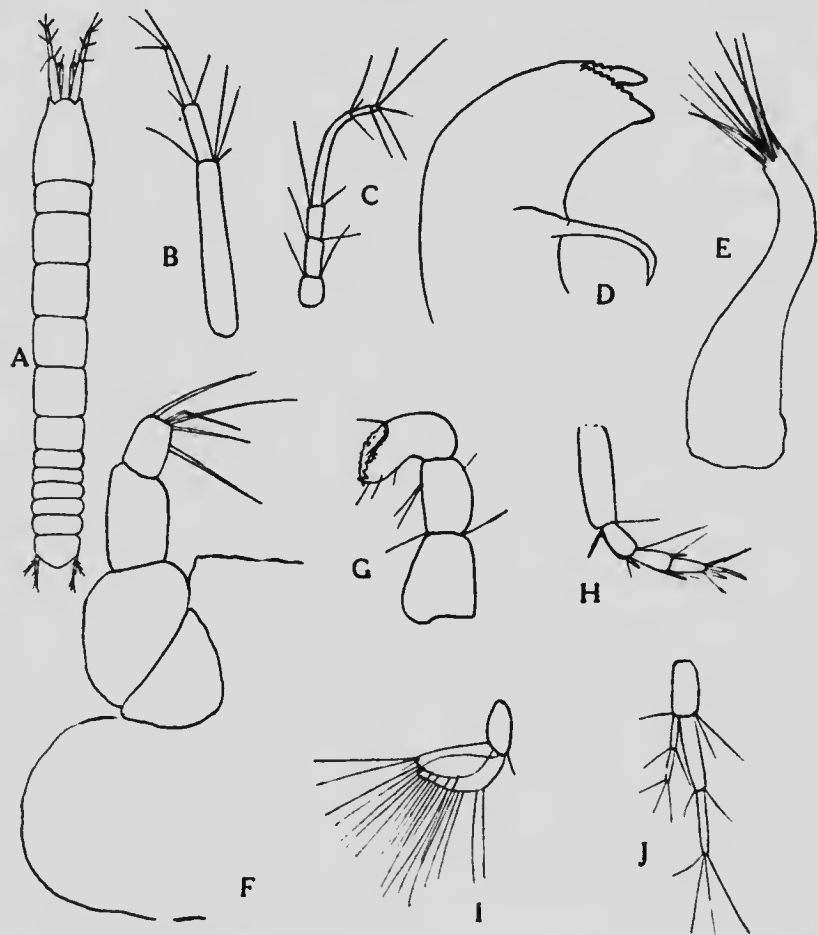


FIG. 3. *Leptognathia* (?) *psammophila*, sp.n.; (A), female, dorsal view, x 20; (B), first antenna, x 80; (C), second antenna, x 80; (D), mandible, x 320; (E), maxilla, x 320; (F), maxilliped, x 320; (G), gnathopod, x 40; (H), fourth leg, x 80; (I), pleopod, x 80; (J), uropod, x 80.

The peduncle of the biramous uropods is stout. The outer branch consists of two subequal, short articles, while the inner



consists of two subequal, long articles, each of which is as long as the entire outer branch.

The gnathopods are large and ovate. The propodus is produced at its extremity into a long, narrow thumb, which is armed on its inner side with two prominent teeth, the point being produced to form a third. The dactylus is long and narrow and produced into a sharp tip which on closure of the chela falls between the teeth at the end of the propodus and the one next to it. The outer surface of the dactylus has a number of short teeth or tubercles. The remaining legs are all ambulatory in character and have not the basal article appreciably expanded as in *Typhlotanais*. The fifth, sixth and seventh are furnished each with a couple of spines on the fourth, fifth, and sixth joints, but those of the second and third legs have only a few setae.

The mandible has a cutting edge of two teeth and a finely serrated anterior border. The molar expansion is very slender. Each maxilla is tipped with a circle of stiff bristles. The maxillipeds have each a palp of four articles.

The position of this species is open to doubt. In the degraded condition of the molar expansion of the mandible it agrees with the genus *Leptognathia*, but differs from it in having the first pair of antennae with only three instead of four articles. It may be necessary to erect a new genus for its reception, but we have considered the condition of the mandibles as of major importance, and have, therefore, placed it in the genus *Leptognathia*.

*Leptochelia filum* (Stimpson). Figure 4.

Stimpson, 1853, p. 43.

This species occurs throughout the whole region at depths varying from 9 to 75 fathoms, chiefly on hard, rocky bottom among *Boltenia ovifera*, but also in old shells, mud or sand. The males are not so numerous as the females, there being as a rule about 8 to 10 females for every male.

Records: Off Biological Station, St. Croix River, 10 to 15 fathoms; off Eastport, Me., 10 fathoms; off Cherry Island,

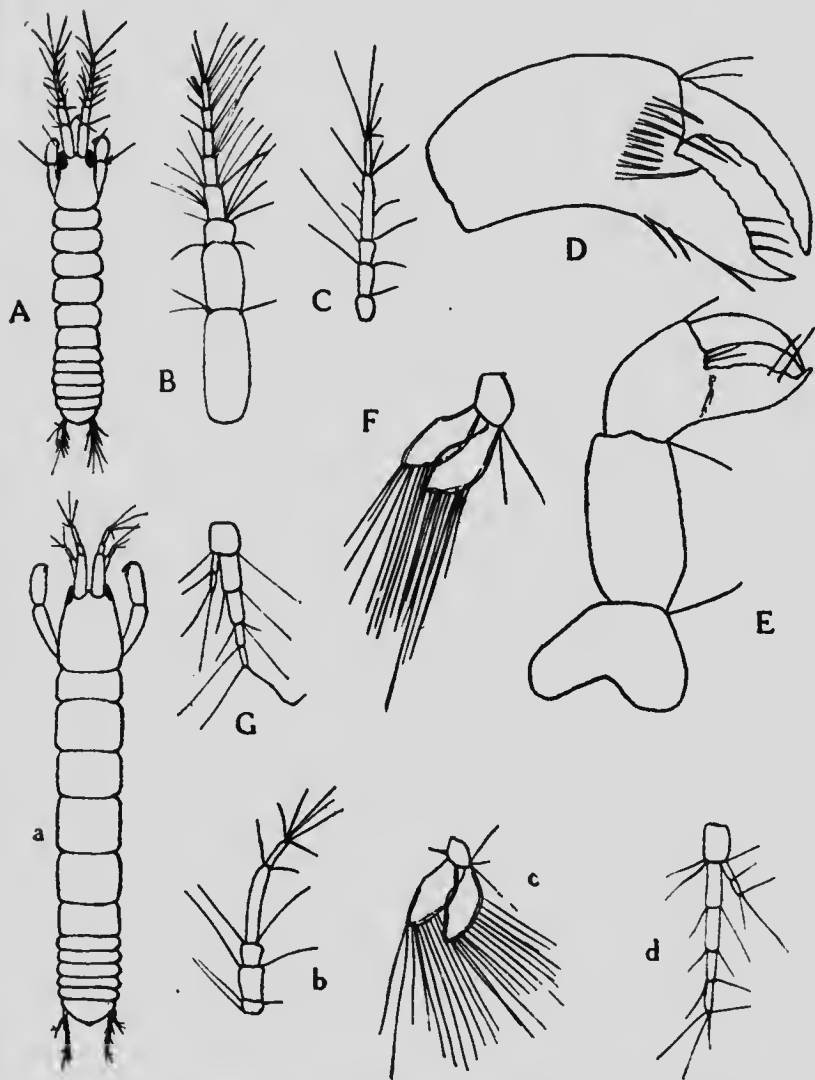


FIG. 4. *Leptochelia flum* (Stimpson); (A), male, dorsal view, x 21; (B), first antenna, x 84; (C), second antenna, x 84; (D), chela of gnathopod, x 154; (E), gnathopod, outer surface, x 84; (F), pleopod, x 84; (G), uropod, x 84; (a), female, dorsal view, x 21; (b), second antenna, x 84; (c), pleopod, x 84; (d), uropod, x 84.

Head Harbour Passage, 42 fathoms; off Spruce Island, 36 fathoms; Head Harbour, 9 fathoms; off Head Harbour Island, 27 and 70 to 75 fathoms; the Wolves, 16 to 30 fathoms; off Low Duck Island, Grand Manan, 34 fathoms; off Big Duck Island, 42 fathoms; off Three Islands, Grand Manan, 17 fathoms. Hake Bay, Grand Manan, 20 fathoms (Stimpson, 1853).

As this species has never been described more thoroughly than in the brief account given by Stimpson, we will consider its structure somewhat fully.

Female: The body is elongated and narrow, about five times as long as broad ( $2\frac{1}{2}$  mm.: 0.5 mm.). The head is longer than it is broad, and has the anterior end narrower than the posterior. The eyes are small, compound and distinct, and situated anterolaterally. The first pair of antennae have the first article long and stout, the second very short, and the third about twice as long as the second. The second pair of antennae are shorter than the first pair, and consist of five articles, of which the first is short and broad, the second a little longer and thinner than the first, the third shorter than the second, the fourth more than twice as long as the third, and the fifth half as long as the fourth.

Of the thoracic segments, the second (first free segment) is about half the length of one of the four that follow it, which are subequal. The seventh is about as long as the second.

The sixth segment of the abdomen is longer than any of the other five and is rounded posteriorly. The outer branch of the biramous propods is composed of two very short articles, which are not clearly marked off from each other, but which usually have a stout hair at the joint between them. The inner branch is four times as long as the outer and is composed of four articles, of which the first two are subequal in length and short, and the last two also subequal in length but at the same time one and one-half times as long as the first two.

The gnathopods are large, the propodus being produced at its extremity into a long, narrow thumb, which is armed on

its inner side with a row of low, blunt teeth together with a sharp, prominent tooth at the very tip. The dactyl is long, narrow and sharply pointed. The other legs are ambulatory, with the terminal joint sharply pointed and recurved.

The abdomen has five pairs of well developed biramous pleopods, not quite so large as those of the male and having shorter setae, which do not extend beyond the limits of the terminal segments.

Male: The body is about three-fifths as large as that of the female and equally elongated (1.58 mm.: 0.3 mm.). The head is slightly longer than it is broad and narrows toward the front. The eyes are proportionately much larger than in the female, and occupy the sides of the head lateral to the first pair of antennae. The latter have the first article long and stout, the second nearly as stout but only a little over half as long, and the third only one-third as long as the second and narrower. The flagellum is nearly as long as the peduncle and is multi-articulate, consisting of five articles, which, with the exception of the exceedingly minute terminal one, are subequal in length. There is some indication of the separation of the first and fifth articles into two parts in the presence of numerous hairs. The second pair of antennae are shorter than the first pair and not as stout. Each consists of six articles, of which the first is short and stout, the second twice as long as the first, the third shorter than the second, the fourth three times as long as the third, the fifth twice as long as the third, and the sixth quite inconspicuous.

The thoracic segments are similar to those of the female except that the fifth and sixth segments are a little longer than the third and fourth. The thorax narrows to the sixth segment.

The last abdominal segment is very obtusely pointed posteriorly, being nearly round. The abdomen is broadest in the middle and tapers to each end. The uropods are as in the female.

The gnathopods are similar to those of the female, but the thumb is not so well armed, and the inner surface of the propodus has a comb of long, sharp spines, usually 7 to 10 in number, which extend across the article parallel to the joint with the dactyl. Of the legs the second pair are longer than those following.

The abdomen has five pairs of well developed, biramous pleopods, which are slightly smaller than those of the female, but have long setae extending beyond the terminal segment and, therefore, appearing in a view from above.

*Leptochelia profunda* sp.n. Figure 5.

Males and females of this species were obtained off Head Harbour Island at a depth of from 70 to 75 fathoms, from a bottom of sandy mud and stones on September 2nd, 1913.

Female: The body is elongate and filiform, being about six times as long as broad (about 2.7 mm.: 0.48 mm.). The head (cephalosome) is a little longer than wide, and is narrower at its anterior end than posteriorly. The anterior margin is excavated at each side of a small median projection for the reception of the first pair of antennae. The eyes are proportionately smaller than in the male. The first pair of antennae are triarticulate, the first article being long, the second one-third as long as the first, and the third nearly twice as long as the second. The second pair of antennae are as in the male.

The second (first free) thoracic segment is the shortest, the third, fourth, and fifth progressively longer, and the fifth, sixth and seventh progressively shorter. The gnathopods and the other thoracic legs are as in the male. The abdomen resembles that of the male. The pleopods have shorter setae than in the male, while the uropods may have only five segments in the inner branch, in which case the first article gives an indication of subdivision in the presence of a bristle about its middle.

Male: The body is long and filiform, being nearly six times as long as broad (about 2 mm.: 0.35 mm.). The

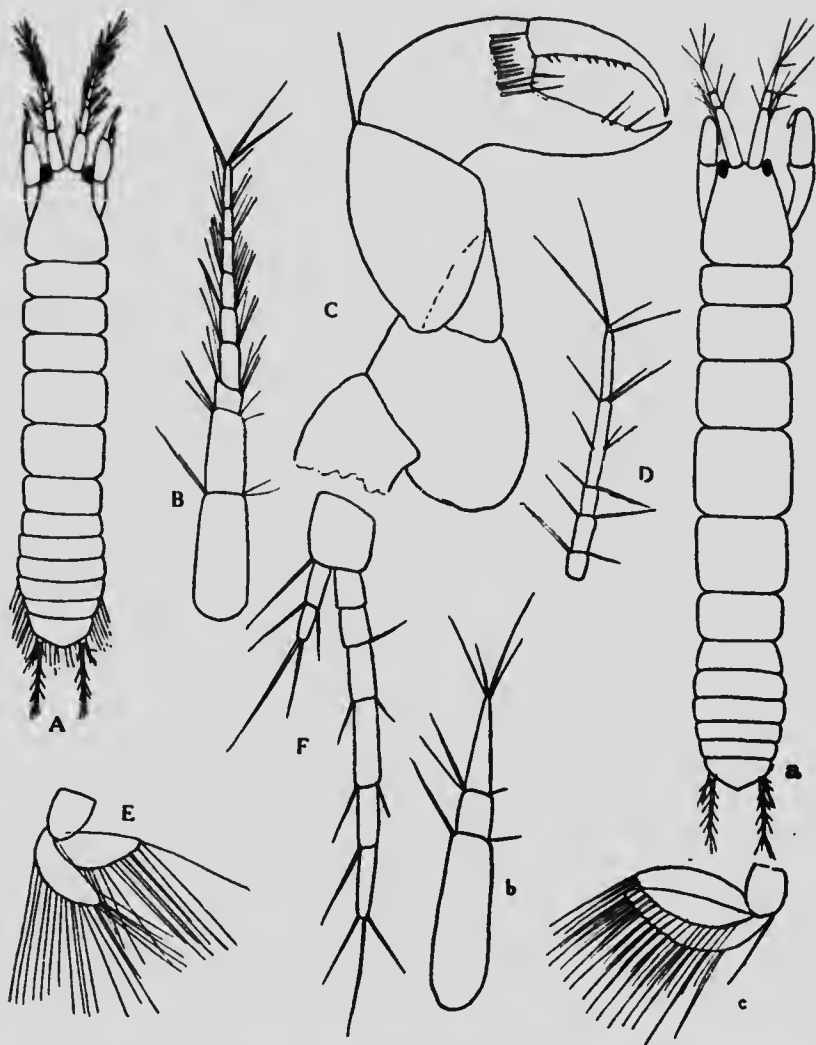


FIG. 5. *Leptochelia profunda* sp. n.; (A), male, dorsal view, x 30; (B), first antenna, x 120; (C), gnathopod, x 120; (D), second antenna, x 120; (E), pleopod, x 120; (F), uropod, x 180; (a), female, dorsal view, x 30; (b), second antenna, x 120; (c), pleopod, x 120.

head is about as long as it is broad and is narrower in front. The anterior margin is slightly excavated on each side of a short, median, blunt point for the first pair of antennae. The eyes are very large and occupy the anterolateral angles of the head. The first pair of antennae have the first article long and stout, the second about three-quarters of the length of the first and nearly as stout, and the third one-third as long as the second and with a slight projection on the medial side. The flagellum consists of six articles. The second pair of antennae consist of a peduncle with five articles and a single, minute, flagellar article. The first three peduncular articles are short, the fourth is nearly as long as the first three together, and the fifth is three-quarters as long as the fourth.

The second, third, fourth and seventh thoracic segments are subequal in length, the second being a little shorter than the others. The fifth and sixth segments are longer than any of the others and subequal.

The gnathopods are quite stout, and the propodus of each has on its inner, medial surface a comb of strong setae arranged in a line parallel to the joint with the dactyl. The other legs, which are ambulatory, have the dactyl produced into a sharp point, that of the second leg being much longer than those of the following.

The sixth abdominal segment ends posteriorly in an obtuse angle. The pleopods are like those of *L. filum* and have long setae projecting beyond the edges of the abdomen. The biramous uropods have the inner branch as long as the last three abdominal segments together and six-jointed. The outer branch is biarticulate and short, being equal in length to the first two articles of the inner branch.

This species differs from *L. savignyi* in that (1) the outer branch of the uropods is biarticulate, (2) the propodus of the gnathopods is devoid of teeth, and (3) the articles of the peduncle of the first pair of antennae have different relative lengths. It differs from *L. filum* in that (1) it is larger, (2) the males are relatively more numerous, (3) there are more articles in the flagellum of the first pair of antennae, (4) the

inner branch of the uropod has six articles, and (5) the inner surface of the thumb of the propodus of the gnathopod is without teeth.

Family *Gnathiidae*

*Gnathia cerina* (Stimpson).

Richardson, 1905, p. 59.

This species was found in abundance throughout the Bay of Fundy and in Passamaquoddy Bay at depths of from five to fifty-five fathoms on sand or mud or among old shells, and on hard stony bottoms. Also the larvae were taken from the surface of the following fishes: winter flounder (*Pseudopleuronectes americanus*), cod (*Gadus callarias*), hake (*Urophycis tenuis* or *U. chuss*), and haddock (*Melanogrammus aeglefinus*).

Records: St. Croix River, off Atlantic Biological Station, 15 fathoms; Gleasen's Cove, 1-5 fathoms; off Bald Head, Campobello, 20 fathoms; the Wolves, 16 to 35 fathoms; Grand Manan, off Fish Head, Duck Islands, Green Islands, and Southern Head, 12 to 55 fathoms. Eastport, 10 to 20 fathoms; off Head Harbour, 40 fathoms; Bay of Fundy, 25-30 and 60 fathoms (Harger, 1880). Off Cheney's Head, Grand Manan, 10 fathoms (Stimpson, 1853). In most cases males, females and larvae were obtained. Larvae alone were found living parasitically on fishes at the following localities: on flounder at Campobello Island; on cod and hake at Bliss Island; and on haddock in the St. Croix River and Passamaquoddy Bay.

Family *Anthuridae*

*Ptilanthura tenuis*, Harger.

Harger, 1880, p. 406.

Body very narrow and elongate, being ten times as long as broad (7.8 mm. long, 0.8 mm. broad.) Head a little broader than long with the anterior margin produced into a short and blunt rounded process which covers over the bases



of the antennae. Eyes are small, rounded, and very distinct. The first antenna has the first two articles subequal in length, while the third is a little longer than the second. The fourth, or first article of the flagellum, is equal to the third, while the fifth is very minute.

The second pair of antennae have the first article very short; the second is about three times as long as the first; the third article is about one-half as long as the second; the fourth and fifth are a little longer than the third and are subequal. The flagellum is composed of three articles and is covered with hairs. The first pair of antennae extend to the end of the peduncle of the second pair. The maxilliped has a palp consisting of two articles. Each maxilla terminates in a number of conspicuous, sharp teeth. The labium terminates in two rounded lobes.

The first thoracic segment is longer than the head. The second and third are equal in length and each is a little longer than the first. The fourth and fifth are slightly longer than the third, and the sixth is a little shorter than the fifth, while the seventh is about half as long as the sixth.

The abdomen is more than twice as long as the seventh thoracic segment. Its first five segments are coalesced, only sutures indicating the segments. The sixth segment is free and bears the uropods. The terminal segment is evenly rounded posteriorly.

The peduncle of the uropods is as long as the superior branch, which is rather lanceolate in shape and acutely pointed posteriorly. The inferior branch is one-half as long as the peduncle and is rounded posteriorly.

The first three pairs of legs are prehensile in character while the others, though with recurved dactyls, are ambulatory in character.

The colour is a mottled brownish-red and white.

One specimen was taken in Seal Cove Sound, Grand Manan, at a depth of eleven and a half fathoms, fine sand bottom. Grand Manan (Harger 1880).

(Mr. Wallace believed this to be a species of *Cyathura*, judging by the partially fused condition of the abdomen, and by the presence of two joints in the palp of the maxilliped. There can, however, scarcely be any doubt but that this is the female of Harger's species, and consequently any distinct difference between the genera *Cyathura* and *Ptilanthura* must be restricted to the second pair of antennae of the male. A. G. H.).

*Calathura branchiata* (Stimpson).

Richardson, 1905, p. 72.

This form is very abundant in the Bay of Fundy, but not in Passamaquoddy Bay. Numerous specimens were taken near the Wolves Islands, near White Horse Island, and off Head Harbour Island at depths of from twenty to seventy-five fathoms on muddy bottom or in mud with sand and gravel. Off Duck Island, Grand Manan, 20 fathoms (Stimpson, 1853). Off Head Harbour, 75-80 fathoms; between Head Harbour and the Wolves, 60 fathoms; Grand Manan (Harger, 1880).

Family *Cirolanidae*

*Cirolana polita* (Stimpson).

Richardson, 1905, p. 99.

Specimens of this species were not very numerous, being taken only near West Quoddy head, Maine and at Grand Manan at depths varying from low tide mark to forty fathoms. The nature of the bottom on all occasions was soft fine sand.

Records: Inside West Quoddy Head, Maine, low tide and 9 fathoms; Whale Cove, Grand Manan, 30 to 40 fathoms; Woodward's Cove, Grand Manan, low tide and 2 fathoms. High Duck Island, Grand Manan, low tide (Stimpson 1853).

The specimens agreed with the description given by Richardson (1905, p. 99) except that there was a considerable variation in the number of articles in the flagellum of the

second pair of antennae, the number ranging from 7 to 19, but usually there were 10.

Family *Aegidae*

*Aega psora* (Linn.).

Richardson, 1905, p. 168.

Only three individuals of the "salve-bug" were seen, and none of these was taken in Passamaquoddy Bay.

Records: From cod (*Gadus caltarias*), near Campobello Island; from skate (*Raia radiata*) caught off North Head, Grand Manan; from skate (*Raia stabuliforis*) caught in St. Mary Bay, N.S.

Family *Limnoriidae*

*Limnoria lignorum* (Rathke). "Gribble".

Richardson, 1905, p. 269.

This isopod is abundant all through the region on nearly all submerged pieces of wood and timber, which it destroys by burrowing into them. Bay of Fundy (Harger, 1880).

Family *Idotheidae*

*Chiridotea caeca* (Say).

Richardson, 1905, p. 353.

The animals of this species were not so abundant as those of the next species and occurred only in very shallow water (two fathoms or less in depth) and on fine sand bottom.

Records: Inside West Quoddy Head, Maine, at low tide; Woodward's Cove, Grand Manan, at low tide and at a depth of about two fathoms.

The specimens ranged in size up to a length of about 15 mm.

*Chiridotea tuftsii* (Stimpson).

Richardson, 1905, p. 354.

This species was taken in abundance at depths of from 5 to 12 fathoms on sandy bottom.

Records: Duck Pond, Campobello, 5 fathoms; off West Quoddy Head, 9 fathoms; Seal Cove Sound, 12 fathoms; off Green Island, Grand Manan, 11 fathoms. At low water in Prince's Cove, Eastport (Harger, 1880). Off Cheney's Head, Grand Uanan, 10 fathoms (Stimpson, 1853).

An examination of numerous specimens showed the number of articles in the flagellum of the second pair of antennae to be variable, ranging from 10 to 14.

*Idothea baltica* (Pallas).

Richardson, 1905, p. 364.

This form is not very common in the Bay of Fundy nor in Passamaquoddy Bay. It was found usually at low tide among seaweed and eelgrass, and also on floating seaweed and at depths as great as 5 fathoms on gravel or sand bottom.

Records: Minister's Island, low tide; St. Croix River near Biological Station, at the surface on seaweed; Katy Cove, low tide; Deep Cove, Campobello, low tide mark; Woodward's Cove, Grand Manan, low tide; Grand Harbour, Grand Manan, 2 to 5 fathoms; Little River, St. Mary Bay, N.S., in lobster pond. Grand Nanan, rare (Stimpson, 1853). Bay of Fundy (Harger, 1880).

*Idothea phosphorea* (Harger).

Richardson, 1905, p. 366.

This is found more generally in the Bay of Fundy than is the preceding species, being taken in many places, at depths ranging from low tide mark to 15 fathoms, on mud, sand or sawdust, or on hard, rocky bottom.

Records: Minister's Island, low tide; Oak Bay, 5 to 9 fathoms; St. Croix River near Biological Station, 5 and 15 fathoms; Gleason's Cove, 1 to 5 fathoms; Woodward's Cove and Grand Harbour, Grand Manan, 2 to 5 fathoms; Lepreau ledges, low tide. Whiting River (Harger, 1880). St. Andrews region (MacDonald, 1912).

The number of articles in the flagellum of the second pair of antennae was noted to be as low as 10 in what were apparently adult individuals.

*Synidotea nodulosa* (Kröyer).

Richardson, 1905, p. 388.

Only two specimens were seen. One, taken near Green Islands, Grand Manan, at a depth of 11 fathoms, was olive green in colour and corresponded with the description given by Richardson (1905, p. 388). The other, dredged in Seal Cove sound, Grand Manan, at a depth of 12 fathoms on a bottom of fine sand, was dark, yellowish-brown, excepting the fourth thoracic segment, which was distinctly red. It differed otherwise in that the flagellum of the second pair of antennae consisted of eight articles instead of six, the tubercles on the body were much sharper, and the abdomen was more sharply pointed.

*Edotea triloba* (Say). Figure 6.

Synonyms:

*Idotea triloba*, Say, 1818, p. 425.*Epelys trilobus*, Harger, 1873, p. 571, et auct. var.*Edotea triloba*, Miers, 1883, p. 70 et auct. var.*Idotea montosa*, Stimpson, 1853, p. 40.*Epelys montosus*, Harger, 1873, p. 571, et auct. var.*Edotea montosa*, Miers, 1883, p. 72, et auct. var.*Edotea acuta*, Richardson, 1900, p. 228, and 1905, p. 395.

This species was found to be very abundant throughout the region, and occurred in depths ranging from low tide mark to 15 fathoms, and on a variety of bottoms—mud, sand, shells, rock and sawdust.

Records: Brandy Cove, off Joe's Point, and off Navy Island, St. Croix River, 2 to 15 fathoms; St. Andrews Harbour, 2 to 3 fathoms; Gleason's Cove, 1 to 5 fathoms; off Eastport, 10 fathoms; Deep Cove, low tide and Duck Pond, Campobello, 1 to 5 fathoms; off West Quoddy Head, 9 fathoms; entrance to Head Harbour, 5 fathoms; Bliss Island, low tide; Grand Harbour, 2 to 5 fathoms and Woodward's Cove, Grand Manan, 0 to 2 fathoms. Grand Manan (Stimpson, 1853). Eastport; Whiting River; Seal Cove, Grand Manan (Harger, 1880).

The size reached 10 mm.

The body is ovate, the length varying from two to two and one-half times the breadth, and the abdomen is usually about one-third the length of the entire animal.

The head is about twice as broad as long with the lateral angles markedly produced and varying in form from rounded lobes to knob or horn-like projections, as described by Richardson for *Edotea acuta*, all the intermediate stages being repre-

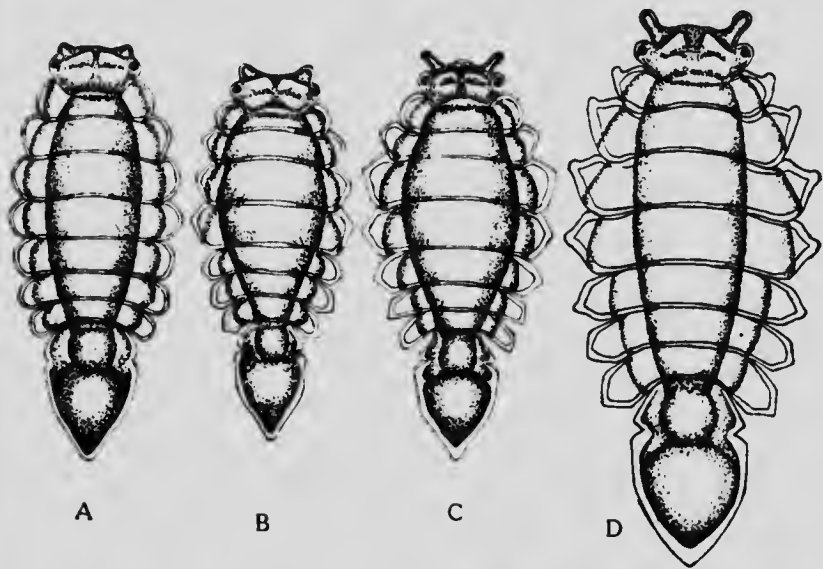


FIG. 6. *Edotea triloba* (Say); (A), (B), and (C), individuals dredged off West Quoddy Head in 9 fathoms, sand bottom, Aug. 13, 1912; (D), individual dredged in Seal Cove sound, 11½ fathoms, sand bottom, July 17, 1913.

sented in a series taken from the one locality. The eyes are large and situated just behind the anterior projections. The top of the head has two conspicuous tubercles, one on either side of the median line, close together and near the anterior end. Most of the individuals showed a slight depression just behind the tubercles, but not nearly so well defined as figured by Richardson for *Edotea acuta*, although in relatively the same position (see Figure 6).

The third and fourth thoracic segments are the longest and also the widest, being nearly equal in width. The epimera are firmly fixed to each segment. The lateral margins of the thoracic segments vary from being sharply angular and, in the case of the anterior ones, having more or less knob-shaped projections, to being broadly rounded or nearly straight, the intermediate conditions found forming a perfect series. The thorax in some individuals was quite convex centrally while in others it was comparatively flat, although those with the greater convexity were more numerous. The lateral portions of the segments are flatter showing a slight elevation towards the edge.

The abdomen is composed of a single segment with incisions of various depths near the base indicating a partly coalesced segment. The sides of the abdomen converge rapidly from a point a little below the middle, and the extremity varies from a triangular condition to a bluntly pointed one. Near the base is a large rounded eminence, which seems to be continuous with the convexity of the thorax; and separated by a deep depression from this tubercle is another elevation which extends nearly to the tip of the abdomen.

After a careful examination of a large series of individuals from the Bay of Fundy, there was found to be a complete gradation in the characters typical of *E. triloba*, *E. montosa* and *E. acuta*, there appearing all conditions of variation from one to another as regards length and form of the lateral projections of the head, borders of the thoracic segments, and general shape of the abdomen. The differences in the relative lengths of the antennae were so slight as to be useless for distinguishing distinct species. There appears to be, therefore, no good reason for separating *E. montosa* and *E. acuta* from *E. triloba*.

#### Family Janiridae

*Jaera marina* (Fabr.).

Richardson, 1905, p. 450.

This species is commonly found in tide-pools and under stones between tide-marks throughout the region. Grand Manan (Stimpson, 1853). Eastport; Dog Island (Harger, 1880).

The size attained was as great as 5.5. mm. in length.

A great variation in the number of articles in the flagellum of the second pair of antennae was found, one specimen having as many as fifty and yet in other respects agreeing with the typical individuals.

*Janira alta* (Stimpson).

Richardson, 1905, p. 475.

Specimens were taken in the Bay of Fundy at depths of from 14 to 75 fathoms on bottoms consisting of hard rock, sand, mud or shells. None were found in Passamaquoddy Bay.

Records: Wolves Islands, 20 fathoms; off Head Harbour Island, 70 to 75 fathoms; Head Harbour Passage (off Cherry Island), 42 fathoms; Whale Cove, Grand Manan, 20 to 30 fathoms; off Southern Head, Grand Manan, 14 fathoms. Grand Manan (Stimpson, 1853). Clark's Ledge near Eastport, low water; off Buckman's Head; off Todd's Head (Harger, 1880).

#### Family *Munnidae*

*Munna fabricii*, Kröyer. Figure 7.

Richardson, 1905, p. 480.

This was taken frequently in the Bay of Fundy, Passamaquoddy Bay and the St. Croix River, at low tide and at depths as great as 42 fathoms, on bottoms consisting usually of sand or mud, but also on those of hard rock or of sawdust.

Records: St. Croix River near Biological Station, 2 to 15 fathoms, Passamaquoddy Bay, off Tongue Shoal light, 5 fathoms; Head Harbour Passage (off Cherry Island), 42 fathoms; near North Head, Grand Manan, low tide mark; off Big Duck Island, Grand Manan, 42 fathoms. South Bay, Eastport, 12 fathoms (Harger, 1880).



The first pair of antennae reach nearly to the penultimate joint of the peduncle of the second pair. The flagellum has three or four joints, usually four.

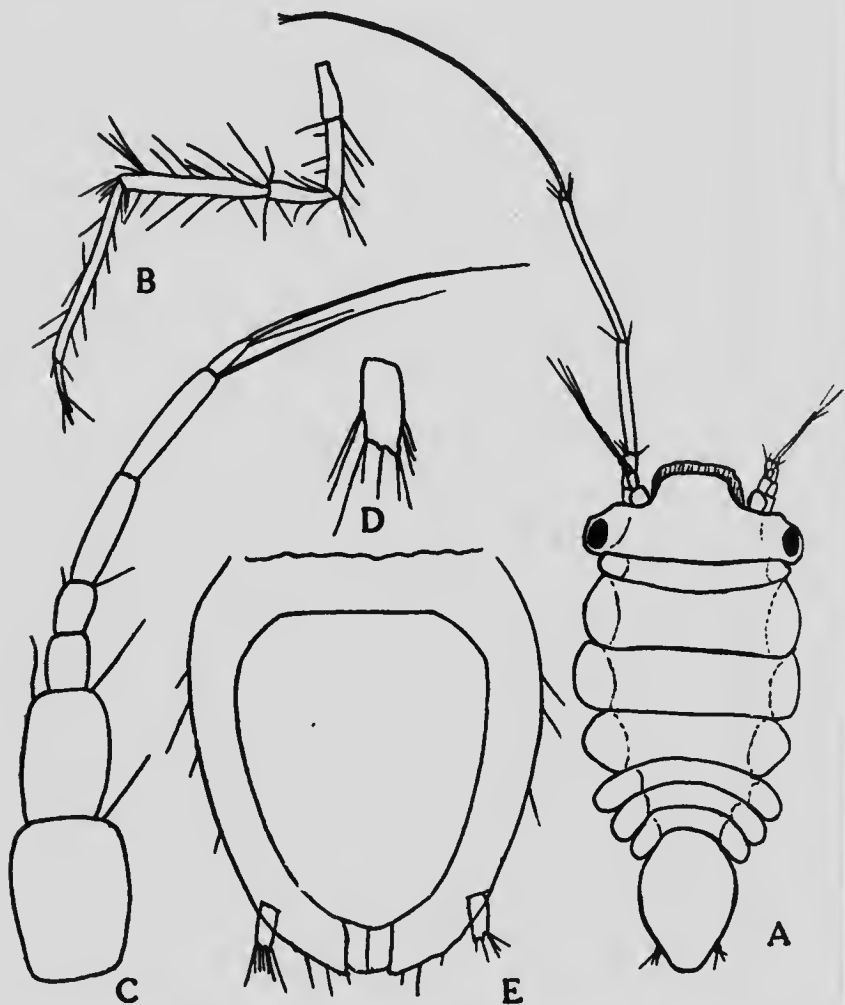


FIG. 7. *Munna fabricii*, Kröyer; (A), dorsal view,  $\times 47$ ; (B), seventh leg,  $\times 47$ ; (C), first antenna,  $\times 370$ ; (D), uropod,  $\times 370$ ; (E), lower surface of abdomen of female, operculum raised,  $\times 185$ .

The flagellum of the second pair of antennae is longer than the peduncle, but varies slightly.

The uropoda are obliquely truncate, but usually show three processes from the free edge.

The caudal segment in large specimens has the apical lamella distinctly serrated and a small hair in place of the lateral denticle, although the size varies. Small specimens often failed to show the serrations on the apical lamella.

The colour was usually a dark dusky brown and often with black spots of pigment.

*Pleurogonium rubicundum* (G. O. Sars). Figures 8 and 9.  
Sars, 1899, p. 113.

This species of *Pleurogonium* is much more restricted in habitat than are the other two that occur in this region. It was found only in the vicinity of St. Andrews, never in the open Bay of Fundy. It was confined to shallow water at depths of from 2 to 5 fathoms on bottoms of sand, mud or sawdust.

Records: Brandy Cove and near Joe's Point, St. Croix River, 2 to 4 fathoms; outside Tongue Shoal light, Passamaquoddy Bay, 5 fathoms.

Female (Fig. 9): The body is short and stout, being a little less than twice as long as broad. The head is not quite twice as broad as long and is rounded anteriorly. The eyes are entirely absent. The first pair of antennae project laterally from the head and have a peduncle of three articles, of which the first two are subequal, while the third is only about half as long as the others. The flagellum consists of three articles which are nearly subequal in length, the last article being surmounted by a stout bristle and a tuft of hairs. The second pair of antennae project dorsally and laterally from the head, and each is composed of a peduncle of six and a flagellum of seven articles. The first two articles of the peduncle are very small and inconspicuous from above, the third is long and has a decided protuberance on its outer side near the proximal end, the fourth is about one-half as long

as the third and slightly expanded distally, the fifth article is one and one-half times and the sixth about twice as long as the fourth.

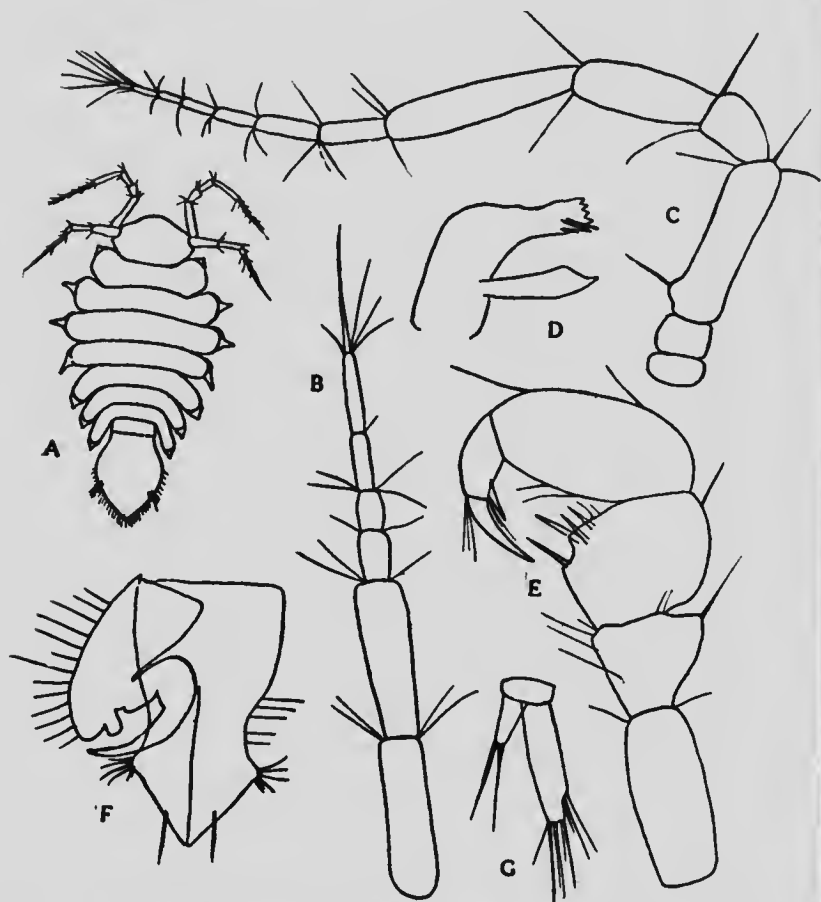


FIG. 8. *Pleurogonium rubicundum* (G. O. Sars); (A), male, dorsal view,  $\times 30$ ; (B), first antenna,  $\times 240$ ; (C), second antenna,  $\times 240$ ; (D), mandible,  $\times 240$ ; (E), gnathopod,  $\times 240$ ; (F), operculum,  $\times 120$ ; (G), uropod,  $\times 240$ .

The first four segments of the thorax with the head are nearly circular in outline, while the last three are markedly narrower and are directed posteriorly. The body is broadest at the level of third thoracic segment. The lateral edges of

the thoracic segments are rounded and from the middle of each projects a long, rod-like spine, those on the third segment being the longest.

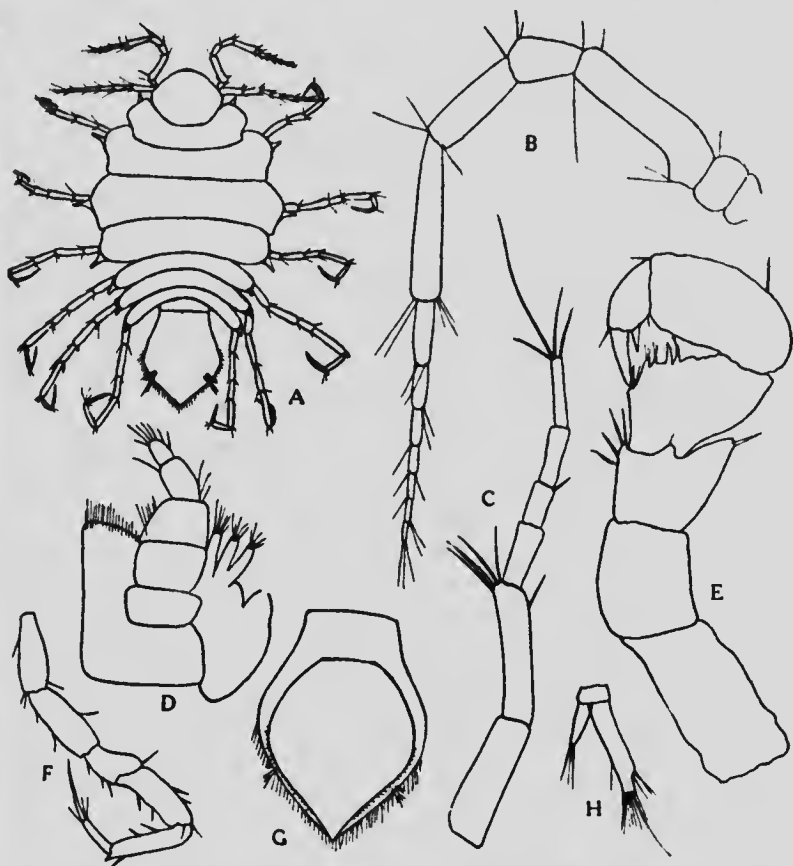


FIG. 9. *Pleurogonium rubicundum* (G. O. Sars); (A), female, dorsal view, x 30; (B), second antenna, x 240; (C), first antenna, x 240; (D), maxilliped, x 240; (E), gnathopod, x 240; (F), second leg, x 60; (G), abdomen, lower surface, x 60; (H), uropod, x 240.

The abdomen is very narrow at the base but widens very much, and again narrows to end in an obtusely pointed tip. The sides of the abdomen are evenly curved and fringed with hairs. The operculum is a little narrower and more sharply pointed than the abdominal segment.

The uropods are terminal and biramous, the outer branch being extremely small, while the inner one is about three times as long and has a slight notch in its inner edge.

The mandible has a slender molar expansion and a cutting part with four teeth. The palp of the maxilliped consists of five articles. The first thoracic leg on each side is strongly recurved for seizing, the carpus strongly armed with spines, and the propodus oval and dilated. The other legs are ambulatory in character.

Male (Fig. 8): The body is short and oval being about twice as long as broad (1.2 mm.: 0.66 mm.). The head is a little broader and not as long as in the female. The eyes are entirely absent. The two pairs of antennae are practically the same as those of the female.

The thorax does not show a distinct division into a rounded anterior portion and a narrower posterior part, but broadens gradually to the third and fourth segments and then narrows. The lateral spines are not quite so pronounced as in the female.

The abdomen, uropods, first legs, and mouth parts are similar to those of the female, but the operculum differs from that of the female in consisting of three parts, an unpaired medial and paired lateral parts. The medial portion is lanceolate in shape and bears a tuft of short, stout hairs at the ends of the expanded points and the lateral parts are oval and flat, and each has a palp-like pointed process on the inner edge.

*Pleurogonium inerme*, (G. O. Sars). Figure 10.

Sars, 1899, p. 114.

This species is somewhat restricted to the inner bays, where it is fairly abundant at depths of from 2 to 10 fathoms on bottoms of mud, sand or sawdust, but a few were taken on hard bottom at a depth of 15 fathoms. It was taken in the open Bay of Fundy at the Wolves on one occasion.

Records: Oak Bay, 5 to 9 fathoms; Brandy Cove, Joe's Point reef, and opposite Robbinston, St. Croix River, 2 to

15 fathoms; St. Andrews harbour, 2 to 3 fathoms; off Tongue Shoal light, Passamaquoddy Bay, 5 fathoms; Wolves Islands, 16 fathoms.

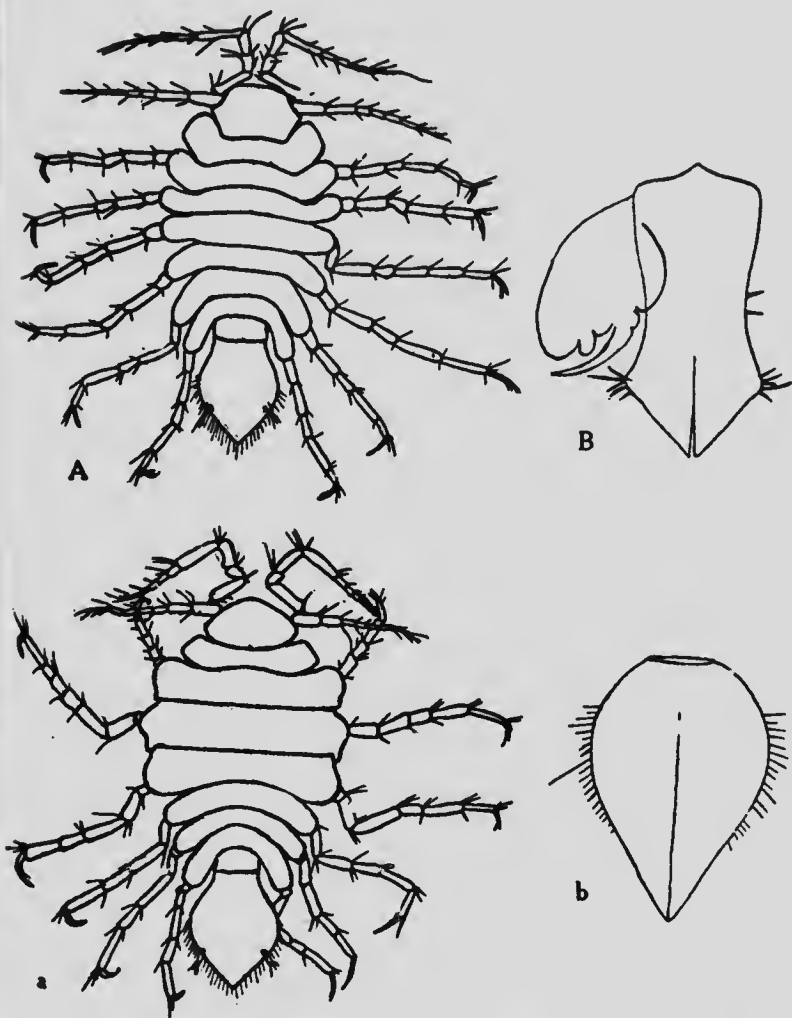


FIG. 10. *Pleurogonium inerme*, (G. O. Sars); (A), male, dorsal view, x 40; (B) operculum, x 150; (a), female, dorsal view, x 40; (b), operculum, x 90.

Female: The body is short and stout, being a little less than twice as long as broad (1.5 mm.: 0.85 mm.). The head is about twice as broad as long and rounded anteriorly. Eyes are entirely absent. The first pair of antennae have a peduncle of three articles of which the first two are long and subequal, and the third one-half as long as the second. The flagellum consists of three articles, of which the first is about one-half the length of the last article of the peduncle, and the second and third subequal and one and one-half times as long as the first. The third article is surmounted by a stout bristle, which is as long as the last two articles together. The second pair of antennae have a peduncle of six and a flagellum of seven articles. In the peduncle the first two articles are very short and equal in length, the third is long and has a prominent protuberance on the outer side near the proximal end, the fourth is less than one-half as long as the third, the fifth is slightly longer than the fourth, and the sixth is twice as long as the fifth.

The four anterior segments of the thorax are nearly circular, while the last three are decidedly narrower, the thorax being broadest at the third segment. The lateral edges of all the thoracic segments are rounded.

The abdomen is much constricted at its base from which it broadens and then narrows to end in an obtusely pointed posterior extremity. The lateral edges are evenly curved and fringed with hairs. The operculum is not as broad as the abdomen and tapers to a sharper point.

The uropods are terminal and biramous, the peduncle consisting of a single short article. The outer branch is extremely small while the inner one is nearly three times as long.

The first leg has the dactyl strongly recurved and is almost exactly the same as that of the preceding species, as is the case also with the other legs. The mandibles are much as in the preceding species, having a slender molar expansion and a cutting part with four teeth. The other mouth parts also are almost the same as those of *P. rubicundum*.

Male: The body is small and oval, being only a little more than twice as long as broad (1.17 mm: 0.55 mm.), resembling that of the young female. The head is about twice as broad as long and is rounded anteriorly. The two pairs of antennae are as in the female.

The thorax does not show two distinct regions as in the female, and is widest at the level of the third and fourth segments, which are subequal in width. The lateral edges of all the thoracic segments are rounded.

The abdomen and uropods are practically the same as those of the female, except that the operculum consists of the usual three parts, of which the medial is lanceolate, with expansions near its middle, each expansion bearing a tuft of short strong bristles, and the two lateral flat and ovate, each having a palp-like pointed process on its medial side.

The first leg and mouth parts are as in the female.

*Pleurogonium spinosissimum* (G. O. Sars). Figure 11.

Sars, 1899, p. 115.

This species has a wider distribution than either of the other two species of the genus in our waters, and it was found as frequently in the open Bay of Fundy as in Passamaquoddy Bay. It occurred at depths ranging from 2 to 75 fathoms, chiefly on bottoms of sand and mud, but also in old shells, or on gravel or stones.

Records: Oak Bay, 5 to 9 fathoms; Brandy Cove and opposite Robbinston, St. Croix River, 2 to 15 fathoms; off Head Harbour Island, 70 to 75 fathoms; Wolves Islands, 16 to 30 fathoms; off Low Duck and Big Duck Islands, Grand Manan, 34 and 42 fathoms; Grand Harbour, Grand Manan, 2 to 5 fathoms.

Female: The body is about twice as long as broad (about 2.25 mm. : 1.2 mm.). The head is twice as broad as long and rounded anteriorly. It is emarginate on each side of the origin of the antennae. The eyes are entirely lacking. The peduncle of the first pair of antennae consists of three articles, of which the first is slightly longer than the second, and the



third one-half as long as the second. The flagellum consists of three articles, of which the first two are subequal, and the third somewhat longer and surmounted by a stout bristle. The second pair of antennae have a peduncle of six and a flagellum of seven articles. In the peduncle the first two articles are short and inconspicuous viewed dorsally, the third is long and has a distinct tubercle on its outer side near the proximal end, the fourth is one-third the length of the third, the fifth is slightly longer than the fourth, and the sixth is twice as long as the fifth.

The first four segments of the thorax are subequal in length while the last three are short and nearly equal in length. The lateral edges of the first four segments are produced each into an irregular angle, from the anterior side of which there projects a long, sharp, diverging, serrated process. The angles of the fourth segment are not nearly so marked as those of the preceding three. Each of the last three segments has a long serrated spine on each side, just as in the anterior ones.

The abdomen is very broad and sharply pointed posteriorly. The operculum is very broad at its middle and is produced into a very sharp, acute tip posteriorly. The uropods are much as in *P. rubicundum*.

The mouth parts and the legs (except the first pair) closely resemble those of the two preceding species, while the carpus and propodus of the first pair of legs are more strongly armed than in those species.

The colour is usually brownish or reddish-brown.

Male: The body is longer and narrower than that of the female, being nearly twice as long as broad (about 1.4 mm.: 0.6 mm.).

The head is much as in the female, as are also the antennae and mouth parts.

The thorax differs from that of the female in that the angular processes from the lateral edges of the first four segments are not nearly so pronounced and are almost entirely

absent in the fourth segment. The legs, including the first pair, are like those of the female.

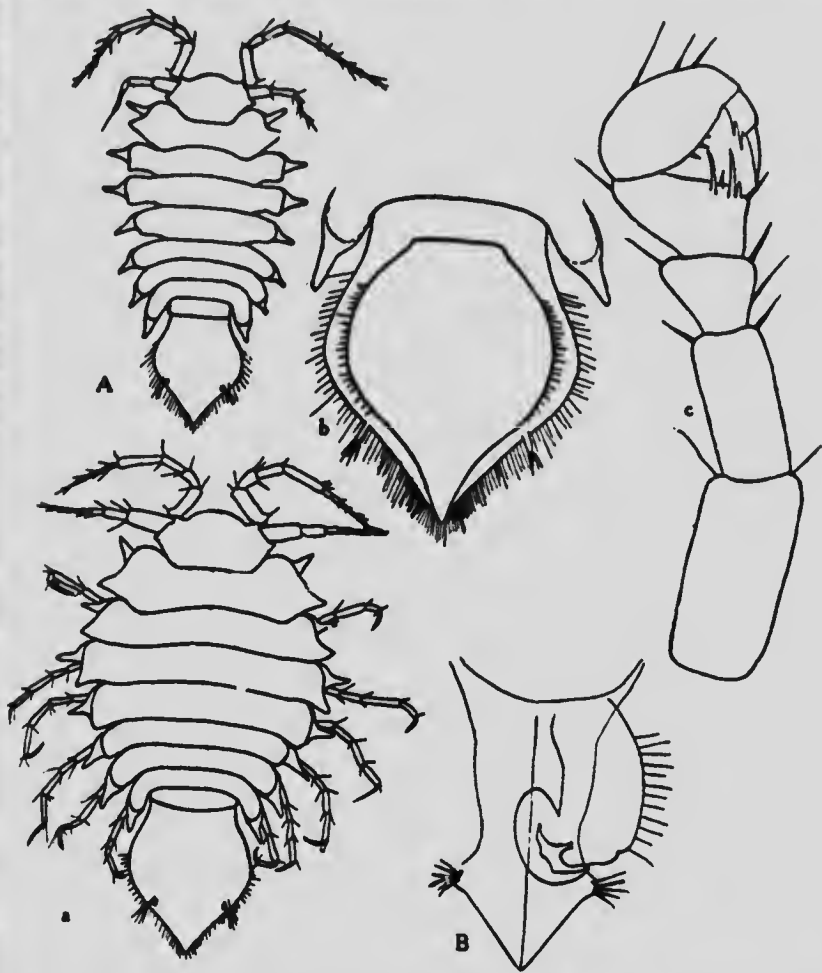


FIG. 11. *Pleurogonium spinosissimum* (G. O. Sars); (A), male, dorsal view, x 30; (B), operculum x 120; (a), female, dorsal view, x 30; (b), abdomen, ventral surface, x 60; (c), gnathopod, x 60.

The abdomen and uropods resemble those of the female. The operculum, which varies much in both sexes, is in the male composed of the customary three segments, the central

part being lanceolate in shape and having an expansion in the middle bearing on each side a tuft of short, stout hairs, and the two lateral portions being flat and oval in outline, and each having a palp-like projection from its medial side, much as in the male of *P. inerme*.

Family *Munnopsidae*

*Munnopsis typica*. M. Sars.

Richardson, 1905, p. 486.

A single specimen was taken, swimming freely at the surface at the mouth of Harbour de Loutre, Campobello Island. The vertical currents resulting from the vigorous flow of the strong tides through the narrow and deep Head Harbour passage have apparently brought this deep water species to the surface. It had previously been dredged by the United States Fish Commission expedition between Head Harbour and the Wolves at a depth of 60 fathoms.

*Eurycope mutica*. G. O. Sars. Figure 12.

Sars, 1899, p. 149.

Only five specimens in all were obtained, three of these in the St. Croix River off Robbinston at a depth of 15 fathoms, on hard, rocky bottom, and two near Tongue Shoal light, Passamaquoddy Bay, at a depth of 5 fathoms on muddy bottom.

The body is short, oval and compact, being slightly less than twice as long as broad and having the greatest width at the middle (1.33 mm.: 0.75 mm.) The anterior end of the head is broad, rounded, and deeply excavated on either side for the reception of the antennae. The lateral margins of the head are produced into short, sharp processes. The superior antennae are short, and each has a very stout basal article. The second article is much more slender and not quite so long, the third and fourth are subequal and together equal to the second, and the flagellum is composed of four articles. The second pair of antennae consist each of a peduncle of five

articles and a multiarticulate flagellum twice the length of the peduncle, the entire antenna being twice as long as the body.

The thorax consists of six distinct segments, the fifth showing indications of a subdivision by sutures which reach

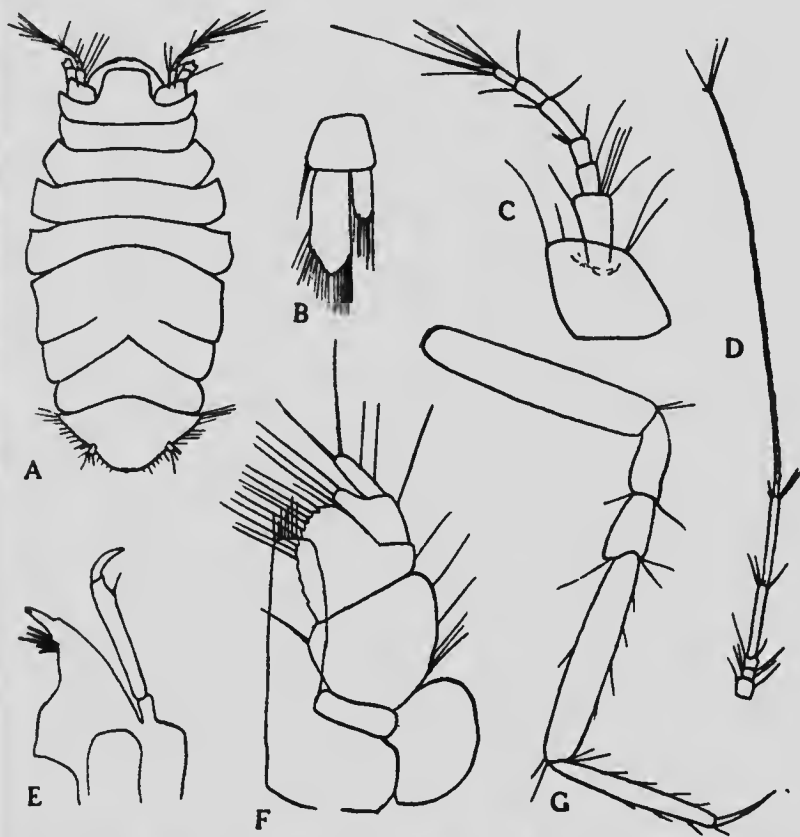


FIG. 12 *Eurycope mutica*, (G. O. Sars); (A), female, dorsal view,  $\times 40$ ; (B), uropod,  $\times 160$ ; (C), first antenna,  $\times 160$ ; (D), second antenna,  $\times 40$ ; (E), mandible,  $\times 160$ ; (F), maxilliped,  $\times 160$ ; (G), first leg,  $\times 160$ .

half way across the body. The lateral margins of the segments are not very sharply produced anteriorly. The abdominal segment is rounded posteriorly while its lateral margins are slightly coarctated.

The legs of the first pair are comparatively short, and have the propodal joint shorter than the carpus, and the dactylus very small. The natatory legs have the carpal joint oval in shape with a slight expansion on one side. The uropods are very small and biramous, each branch being uniarticulate. The outer branch is oval and about one-half as long as the inner, which is lanceolate in shape.

The mandibles have cutting edges of sharp teeth and large, broad, molar expansions; the palp is large and curved. The maxillae are normal. Each maxilliped has a palp of five articles and an epignath which is short, broad and obtusely truncated at the tip.

#### Family *Bopyridae*

*Phryxus abdominalis* (Kröyer).

Richardson, 1905, p. 500.

This parasite was found only on specimens of *Spirontocaris pusiola*, which were collected at the following places:—Minister's Island, Passamaquoddy Bay, low tide; Head Harbour, Campobello Island, 5 fathoms; Grand Passage, off Dartmouth Point, St. Mary Bay, N.S., 15 fathoms; between North-west ledge and Brier Island, N.S., 32 to 36 fathoms.

*Bopyroides hippolytes* (Kröyer).

Richardson, 1905 p. 567.

This species was taken at the following places:—Digdequash Harbour, 9 to 11 fathoms, on *Spirontocaris polaris*; south-east from Swallow Tail light, Grand Manan, "hake grounds", on *Spirontocaris spinus*; High Duck Island, Grand Manan, low tide, on *Spirontocaris pusiola*. Bay of Fundy on *Spirontocaris spinus* and *S. pusiola*. (Harger, 1880).

#### Family *Oniscidae*

*Cylisticus convexus* (De Geer).

Richardson, 1905, p. 609.

Specimens of this species were obtained from under

decaying bark at Chamcook Mill near St. Andrews, and others were found by Dr. Philip Cox at Fredericton under stones.

*Porcellio rathkei* (Brandt).

Richardson, 1905, p. 617.

A few specimens of this form were taken in dry sand and also in shaded woods near St. Andrews, also some by Dr. Cox at Fredericton.

*Porcellio scaber* (Latreille).

Richardson, 1905, p. 621.

This species is common under driftwood above high tide throughout the region.

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